Shelter Design

Key Questions:

- What are some characteristics of the Moon environment?
- What are some of the potential risks to human health?
- How might temperature and radiation impact the shelter design?
- How long is a "Moon day," and how might that impact the shelter design?
- How will structures be constructed?
- What will they look like?

Shelter Design Overview:

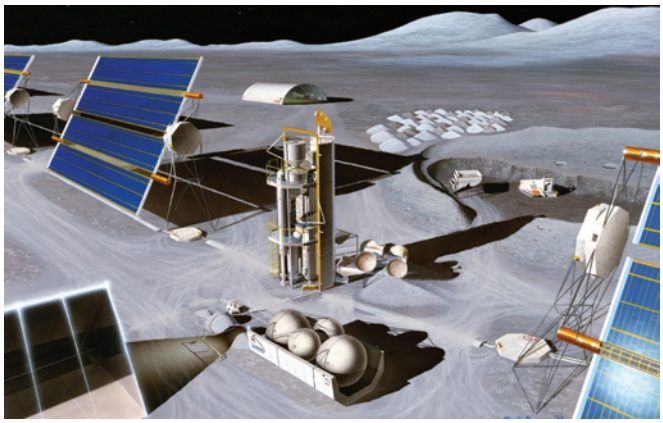
Most people in the United States live in a structure made of wood, concrete, or a composite material. Some of these structures take months to construct, while others can take a few years. How will an appropriate shelter be designed for the Moon? Who or what will build it?

Before thinking about what it will look like, consider some of the constraints that the Moon's environment might place on shelter design. These constraints include the temperature, radiation, length of the day, soil composition, and more. The following information is from Wikipedia at:

Wikimedia Foundation, Inc. (May, 2007). *Wikipedia: The Free Encyclopedia*. Retrieved May 10, 2007, from <http://en.wikipedia.org/wiki/Lunar_base#Habitat>.

Habitat:

There have been numerous proposals regarding habitat modules. The designs have evolved throughout the years, as humankind's knowledge about the Moon has grown and as the technological possibilities have changed. The proposed habitats range from the actual spacecraft landers or the used fuel tanks, to inflatable modules of various shapes. Early on, some hazards of the lunar environment, such as sharp temperature shifts, lack of atmosphere or magnetic field (which means higher levels of radiation and micrometeoroids), and long nights, were recognized and taken into consideration.



Some suggest building the lunar colony underground, which would give protection from radiation and micrometeoroids. The construction of such a base would probably be more complex; a remote-controlled boring machine to excavate living quarters might need to be one of the first machines from Earth. Once created, some sort of hardening would be necessary to avoid collapse, possibly a spray-on, concrete-like substance made from available materials. A more porous insulating material also made in situ could then be applied. Inflatable self-sealing fabric habitats might then be put in place to retain air. As an alternative to excavating, it is possible that large underground extinct Lava tubes might exist on the Moon. As of 2004, existence of lava tubes on the Moon has not been confirmed.

A possibly easier solution is to build the lunar base on the surface and cover the modules with lunar soil. Others have put forward the idea that the lunar base could be built on the surface and protected by other means, such as improved radiation and micrometeoroid shielding. Artificial magnetic fields have been proposed as a means to provide radiation shielding for long range, deep-space manned missions, and it might be possible to use similar technology on a lunar colony.

Internet Web Sites:

NASA Chooses Purdue to Study Colonies on Mars

Jong, Diana (Staff Writer). (August 15, 2002). *NASA chooses Purdue to study colonies on Mars*. Space.com. Imaginova Corp. Retrieved May 10, 2007, from <http://www.space.com/scienceastronomy/purdue_center_020815.html>.

- This web site article describes the work that Purdue University has done with Biosphere 2, which is in the Arizona desert and is intended to simulate life on the Moon or Mars.

Lunar Base Designs

Smith, Linda (NASA Official). (October 25, 2006). *Lunar base designs*. NASA. Retrieved May 10, 2007, from <http://aerospacescholars.jsc.nasa.gov/HAS/cirr/em/6/8.cfm>.

- This site describes both historic and futuristic lunar base designs. There are many pictures and additional links that provide further information.